

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-8 (Cancelled).

Claim 9 (Previously Amended): An image processing method comprising:

discriminating whether a display device is an impulse type display device;

incorporating input frame pictures to be displayed on the display device, on the basis of an input picture signal and an input synchronizing signal that is synchronized with the input picture signal;

recording the incorporated input frame pictures in an input frame memory;

producing output frame pictures from the input frame pictures, which have been recorded in the input frame memory, by producing an interpolated picture or inserting a black raster picture or thinning out the input frame pictures, between input frame pictures corresponding to a picture information of the input frame picture to be displayed, on the basis of the picture information and the input synchronizing signal and an output synchronizing signal, the picture information including information that indicates whether the picture to be displayed is a moving picture or a still picture; and

discriminating whether the picture to be displayed is a moving picture or a still picture, comprising:

incorporating frame pictures to be displayed, at regular intervals on the basis of the input picture signal and the input synchronizing signal;

obtaining a correlation between two frame pictures that have been continuously incorporated, the method discriminating whether the picture to be

displayed is a moving picture or a still picture on the basis of the correlation result; and

when it is determined that the picture to be displayed is a moving picture, determining whether the moving picture is in a first state in which the motion of a moving object in the moving picture is rapid, or in a second state in which the moving speed of the moving object is slower than that in the first state, on the basis of the correlation,

wherein when it is discriminated that the display device is the impulse type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stopping the output of signals between the input frame pictures, or inserting and outputting a black raster picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 10 (Previously Amended): An image processing method comprising:  
discriminating whether a display device is a hold type display device;

incorporating input frame pictures to be displayed on the display device, on the basis of an input picture signal and an input synchronizing signal which is synchronized with the input picture signal;

recording the incorporated input frame pictures in an input frame memory;

producing output frame pictures from the input frame pictures, which have been recorded in the input frame memory, by producing an interpolated picture or inserting a black raster picture or thinning out the input frame pictures, between input frame pictures corresponding to a picture information of the input frame picture to be displayed, on the basis of the picture information and the input synchronizing signal and an output synchronizing signal, the picture information including information which indicates whether the picture to be displayed is a moving picture or a still picture; and

discriminating whether the picture to be displayed is a moving picture or a still picture, comprising:

incorporating frame pictures to be displayed, at regular intervals on the basis of the input picture signal and the input synchronizing signal,

obtaining a correlation between two frame pictures which have been continuously incorporated, the method discriminating whether the picture to be displayed is a moving picture or a still picture on the basis of the correlation result, and

when it is determined that the picture to be displayed is a moving picture, determining whether the moving picture is in a first state in which the motion of a moving object in the moving picture is rapid, or in a second state in which the moving speed of the moving object is slower than that in the first state, on the basis of the correlation,

wherein when it is discriminated that the display device is the hold type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stopping the outputs of the output picture signal and the output synchronizing signal between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 11 (Previously Amended): An image processing method as set forth in claim 9, wherein when it is discriminated that the picture to be displayed is a still picture, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

displaying the same picture between the output frame pictures, or stopping the output of signals between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 12 (Previously Amended): An image processing method as set forth in claim 9, wherein the interpolated picture or the black raster picture is selected in accordance with a spatial frequency and the frequency spectrum in one frame picture.

Claim 13 (Previously Amended): An image processing method as set forth in claim 9, wherein the interpolated picture or the black raster picture is selected in accordance with the speed of a moving object in the picture to be displayed.

Claim 14 (Previously Amended): An image processing system comprising a picture signal converting part configured to convert an input picture signal, which is a picture signal for a picture to be displayed on a display device configured to display a picture while changing the picture every frame picture, and an input synchronizing signal, which is synchronized with the input picture signal, into an output picture signal, which is a picture signal for a picture suitable for the display for the display device, and an output synchronizing signal, which is synchronized with the output picture signal, on the basis of picture information of the picture to be displayed on the display device, the picture signal converting part comprising:

a device discriminating part configured to discriminate whether a display device is an impulse type display device;

an input frame memory in which an input frame picture is recorded;

an input switching part configured to transmit an input frame picture to be displayed, to the input frame memory on the basis of the input picture signal and the input synchronizing signal;

a black raster picture producing part in which a black raster picture has been produced or stored;

a picture converting part configured to produce output frame pictures from input frame pictures, which have been recorded in the input frame memory, by producing an interpolated picture or inserting a black raster picture or thinning out the frame pictures, between frame pictures corresponding to the picture information, on the basis of the picture information and the input synchronizing signal and the output synchronizing signal;

an output frame memory in which the output frame pictures are recorded; and

an output control switching part configured to take the output picture signal and the output synchronizing signal out of the output frame pictures, which have been recorded in the output frame memory, and to transmit the signals to the display device,

wherein the picture information is information which indicates whether the picture to be displayed is a moving picture or a still picture, and which further comprises a motion discriminating part configured to discriminate whether the picture to be displayed is a moving picture or a still picture,

wherein the motion discriminating part incorporates input frame pictures to be displayed, at regular intervals on the basis of the input picture signal and input synchronizing signal, obtains the correlation between two input frame pictures which have been

continuously incorporated, and discriminates whether the input frame picture to be displayed is a moving picture or a still picture on the basis of the correlation result,

wherein when it is determined that the picture to be displayed is a moving picture, the motion discriminating part determines whether the moving picture is in a first state in which the motion of a moving object in the moving picture is rapid, or in a second state in which the moving speed of the moving object is slower than that in the first state, on the basis of the correlation, and

wherein when it is discriminated that the display device is the impulse type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the picture converting part:

compares the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputs the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stops the output of signals between the input frame pictures, or inserts and outputs a black raster picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thins out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claims 15-16 (Cancelled).

Claim 17 (Previously Amended): An image processing system as set forth in claim 14, wherein the motion discriminating part comprises:

a switching part configured to incorporate input frame pictures to be displayed, at regular intervals on the basis of the input picture signal and input synchronizing signal;

a plurality of frame memories configured to store therein the input frame pictures which have been incorporated by the switching part;

means for calculating a differential signal between two input frame pictures which have been continuously incorporated; and

means for discriminating whether the input frame picture to be displayed is a moving picture or a still picture on the basis of the results of the calculation.

Claim 18 (Cancelled).

Claim 19 (Original): An image processing system as set forth in claim 14, wherein the picture signal converting part produces the output frame pictures from the input frame pictures on the basis of a moving or still picture indicating signal, which indicates whether the kind of a picture to be displayed on the display device is a moving picture or a still picture, and the output of the motion discriminating part.

Claim 20 (Cancelled).

Claim 21 (Previously Presented): An image processing method as set forth in claim 9, wherein the correlation is obtained on the basis of the difference between pixels corresponding to the continuously incorporated two frame pictures.



Claim 22 (Previously Presented): An image processing method as set forth in claim 9, wherein the correlation is obtained on the basis of the scalar quantity of a motion vector.

Claim 23 (Previously Presented): An image processing method as set forth in claim 9, wherein when it is discriminated that the picture to be displayed is a moving picture and when it is determined that the moving speed of the moving object in the moving picture is in the first state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

producing an interpolated picture between the input frame pictures to output the interpolated picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 24 (Previously Presented): An image processing method as set forth in claim 10, wherein the correlation is obtained on the basis of the difference between pixels corresponding to the continuously incorporated two frame pictures.

Claim 25 (Previously Presented): An image processing method as set forth in claim 10, wherein the correlation is obtained on the basis of the scalar quantity of a motion vector.

Claim 26 (Previously Presented): An image processing method as set forth in claim 10, wherein when it is discriminated that the picture to be displayed is a moving picture and when it is determined that the moving speed of the moving object in the moving picture is in the first state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

producing an interpolated picture between the input frame pictures to output the interpolated picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 27 (Previously Presented): An image processing method as set forth in claim 10, wherein when it is discriminated that the picture to be displayed is a still picture, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

displaying the same picture between the output frame pictures, or stopping the output of signals between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 28 (Previously Presented): An image processing method as set forth in claim 10, wherein the interpolated picture or the black raster picture is selected in accordance with a spatial frequency and the frequency spectrum in one frame picture.

Claim 29 (Previously Presented): An image processing method as set forth in claim 10, wherein the interpolated picture or the black raster picture is selected in accordance with the speed of a moving object in the picture to be displayed.

Claim 30 (Previously Presented): An image processing method comprising:  
discriminating whether a display device is an impulse type display device or a hold type display device;

incorporating input frame pictures to be displayed on the display device, on the basis of an input picture signal and an input synchronizing signal which is synchronized with the input picture signal;

recording the incorporated input frame pictures in an input frame memory;

producing output frame pictures from the input frame pictures, which have been recorded in the input frame memory, by producing an interpolated picture or inserting a black raster picture or thinning out the input frame pictures, between input frame pictures corresponding to a picture information of the input frame picture to be displayed, on the basis of the picture information and the input synchronizing signal and an output synchronizing

signal, the picture information including information which indicates whether the picture to be displayed is a moving picture or a still picture; and

discriminating whether the picture to be displayed is a moving picture or a still picture, comprising:

incorporating frame pictures to be displayed, at regular intervals on the basis of the input picture signal and the input synchronizing signal;

obtaining a correlation between two frame pictures which have been continuously incorporated, the method discriminating whether the picture to be displayed is a moving picture or a still picture on the basis of the correlation result; and

when it is determined that the picture to be displayed is a moving picture, determining whether the moving picture is in a first state in which the motion of a moving object in the moving picture is rapid, or in a second state in which the moving speed of the moving object is slower than that in the first state, on the basis of the correlation,

wherein when it is discriminated that the display device is the impulse type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stopping the output of signals between the input frame pictures, or inserting and outputting a black raster picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures, and

wherein when it is discriminated that the display device is the hold type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stopping the outputs of the output picture signal and the output synchronizing signal between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 31 (Previously Presented): An image processing method as set forth in claim 30, wherein the correlation is obtained on the basis of the difference between pixels corresponding to the continuously incorporated two frame pictures.

Claim 32 (Previously Presented): An image processing method as set forth in claim 30, wherein the correlation is obtained on the basis of the scalar quantity of a motion vector.

Claim 33 (Previously Presented): An image processing method as set forth in claim 30, wherein when it is discriminated that the picture to be displayed is a moving picture and when it is determined that the moving speed of the moving object in the moving picture is in the first state, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

producing an interpolated picture between the input frame pictures to output the interpolated picture, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 34 (Previously Presented): An image processing method as set forth in claim 30, wherein when it is discriminated that the picture to be displayed is a still picture, the producing of the output frame pictures comprises:

comparing the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputting the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

displaying the same picture between the output frame pictures, or stopping the output of signals between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thinning out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 35 (Previously Presented): An image processing method as set forth in claim 30, wherein the interpolated picture or the black raster picture is selected in accordance with a spatial frequency and the frequency spectrum in one frame picture.

Claim 36 (Previously Presented): An image processing method as set forth in claim 30, wherein the interpolated picture or the black raster picture is selected in accordance with the speed of a moving object in the picture to be displayed.

Claim 37 (Previously Presented): An image processing system comprising a picture signal converting part configured to convert an input picture signal, which is a picture signal for a picture to be displayed on a display device configured to display a picture while changing the picture every frame picture, and an input synchronizing signal, which is synchronized with the input picture signal, into an output picture signal, which is a picture signal for a picture suitable for the display for the display device, and an output synchronizing signal, which is synchronized with the output picture signal, on the basis of

picture information of the picture to be displayed on the display device, the picture signal converting part comprising:

- a device discriminating part configured to discriminate whether a display device is a hold type display device;

- an input frame memory in which an input frame picture is recorded;

- an input switching part configured to transmit an input frame picture to be displayed, to the input frame memory on the basis of the input picture signal and the input synchronizing signal;

- a black raster picture producing part in which a black raster picture has been produced or stored;

- a picture converting part configured to produce output frame pictures from input frame pictures, which have been recorded in the input frame memory, by producing an interpolated picture or inserting a black raster picture or thinning out the frame pictures, between frame pictures corresponding to the picture information, on the basis of the picture information and the input synchronizing signal and the output synchronizing signal;

- an output frame memory in which the output frame pictures are recorded; and

- an output control switching part configured to take the output picture signal and the output synchronizing signal out of the output frame pictures, which have been recorded in the output frame memory, and to transmit the signals to the display device,

wherein the picture information is information which indicates whether the picture to be displayed is a moving picture or a still picture, and which further comprises a motion discriminating part configured to discriminate whether the picture to be displayed is a moving picture or a still picture,

wherein the motion discriminating part incorporates input frame pictures to be displayed, at regular intervals on the basis of the input picture signal and input synchronizing



signal, obtains the correlation between two input frame pictures which have been continuously incorporated, and discriminates whether the input frame picture to be displayed is a moving picture or a still picture on the basis of the correlation result,

wherein when it is determined that the picture to be displayed is a moving picture, the motion discriminating part determines whether the moving picture is in a first state in which the motion of a moving object in the moving picture is rapid, or in a second state in which the moving speed of the moving object is slower than that in the first state, on the basis of the correlation, and

wherein when it is discriminated that the display device is the hold type display device, when it is discriminated that the picture to be displayed is a moving picture, and when it is determined that the moving speed of the moving object in the moving picture is in the second state, the picture converting part:

compares the refresh rate of the input frame pictures with the refresh rate of the output frame pictures;

outputs the input frame pictures as the output frame picture, when the refresh rate of the input frame pictures is equal to the refresh rate of the output frame pictures;

stops the outputs of the output picture signal and the output synchronizing signal between the input frame pictures, when the refresh rate of the output frame pictures is higher than the refresh rate of the input frame pictures; and

thins out the input frame pictures to produce and output the output frame pictures, when the refresh rate of the output frame pictures is lower than the refresh rate of the input frame pictures.

Claim 38 (Previously Presented): An image processing system as set forth in claim 37, wherein the motion discriminating part comprises:

a switching part configured to incorporate input frame pictures to be displayed, at regular intervals on the basis of the input picture signal and input synchronizing signal;

a plurality of frame memories in which the input frame pictures, which have been incorporated by the switching part, are stored;

means for calculating a differential signal between two input frame pictures which have been continuously incorporated; and

means for discriminating whether the input frame picture to be displayed is a moving picture or a still picture on the basis of the results of the calculation.

Claim 39 (Previously Presented): An image processing system as set forth in claim 37, wherein the picture signal converting part produces the output frame pictures from the input frame pictures on the basis of a moving or still picture indicating signal, which indicates whether the kind of a picture to be displayed on the display device is a moving picture or a still picture, and the output of the motion discriminating part.